**NAME………………………………………………………………….. ADM NO……………….**

**121/2 INDEX NO………….….….….…..,,,,,**

**MATHEMATICS ALT A**

**PAPER 2 CLASS……………………………**

**MAR/APR 2024**

**TIME: 2½ HOURS**

LANJET PRE MOCK EXAMINATION - 2024

***Kenya Certificate of Secondary Education***

**MATHEMATICS ALT A**

**PAPER 2**

**TIME: 2½ HOURS**

**INSTRUCTION TO CANDIDATE’S:**

*(a) Write your name, index number and school in the spaces provided at the top of this page.*

*(b) Sign and write the date of examination in spaces provided above.*

*(c) This paper consists of* ***TWO*** *sections:* ***Section I*** *and* ***Section******II****.*

*(d) Answer* ***ALL*** *the questions in* ***Section******I*** *and any* ***five*** *questions from Section* ***II****.*

*(e)* ***Show all the steps in your calculation, giving your answer at each stage in the spaces***

 ***provided below each question****.*

*(f) Marks may be given for correct working even if the answer is wrong.*

*(g)* ***Non-programmable*** *silent electronic calculators and* ***KNEC*** *Mathematical tables may*

 *be used, except where stated otherwise.*

(h) ***This paper consists of 16 printed pages.***

*(i)* ***Candidates should check the question paper to ascertain that all the pages are printed***

 ***as indicated and that no questions are missing****.*

*(j)* ***Candidates should answer the questions in English****.*

**FOR EXAMINER’S USE ONLY:**

**SECTION I**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **TOTAL** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |
| --- | --- |
| **Grand**  |  |
| **Total** |  |

**SECTION II**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **TOTAL** |
|  |  |  |  |  |  |  |  |  |

**SECTION I (50 MARKS)**

***Answer ALL questions in the spaces provided.***

1. Agotho has a rectangular plot that was measured to the nearest meter and found to be 80m in length and 60m in width. Determine the percentage error in its perimeter. (3 marks)
2. Determine the inverse of the matrix $\left(\begin{matrix}4&3\\5&-2\end{matrix}\right)$. Hence find the coordinates of the point at which the two lines 4x – 18 = –3y and 5x – 2y = 11intersect. (4 marks)
3. Solve the equation.

5 2x+1 – 3(5x + 1) + 10 = 0 (4 marks)

1. Solve for x in the equation cos x = sin (3x – 30). Hence determine the value of tan x leaving your answer in surd form. (3 marks)
2. In the figure below, yz is parallel to wx. Angle wzx = 50o and angle wxm = 60o. Determine the size of angle yzw. (2 marks)

 

1. Kaula has two types of coffee, costing Ksh.120 and Ksh.200 respectively. He mixed them in the ratio

6 : 5 by weight.

1. Determine to the nearest shilling the cost of one kilogramme of the mixture. (2 marks)
2. Find the percentage profit on the cost price if the mixture was sold at Ksh 250.

(give your answer in 2 d.p). (2 marks)

1. Rationalise the denominator and simplify leaving your answer in the form $\sqrt{a}+b$. (3 marks)

$$\frac{\sqrt{2}+2\sqrt{5}}{\sqrt{5}- \sqrt{2}}$$

1. Use squares, square roots and reciprocals tables only to evaluate;

$\frac{3}{\sqrt{42.15}}+ \frac{4}{\left(3.152\right)^{2}}$ (4 marks)

1. Make h the subject of the formula in

 m = $\frac{p}{\sqrt{h}+ k^{2}}$ (3 marks)

1. The diagram below shows an equilateral triangle ABC inscribed in a circle of radius 9cm. Calculate the length of the sides of the triangle (2 d.p) (2 marks)

 

1. Simplify $\frac{9x^{2}-1}{3x^{2}+2x-1}$ (3 marks)
2. Use the trapezium rule to estimate the area bounded by the curve y + x2 = 4 and the lines y = 0, x = −2 and x = 2 using four strips. (3 marks)
3. A circle of radius 3cm has its centre at (3, −2). Express the equation of the circle in the form

x2 + y2 + mx + ny + c = 0. Where m, n and c are constants. (3 marks)

1. Find the equation of the normal to the curve y = (x2 + 1) (x – 2) when x = 2. (4 marks)
2. a) Expand $\left(1-\frac{1}{2}x\right)^{5}$ (1 mark)

 b) Use the expansion upto x3 in (a) above to evaluate (0.98)5 correct to 4 d.p (2 marks)

1. The figure below shows a quadrilateral ABCD which is cyclic. Solve for x. (2 marks)

 

**SECTION II (50 MARKS)**

*Answer only* ***FIVE*** *questions from this section in the spaces provided.*

1. Mr. Kobe is a civil servant who earns a monthly salary of Ksh.21200. He has a house allowance of Ksh.12000 per month, other taxable allowances are commuter Ksh.1100, medical allowance Ksh.2000. He is entitled to a personal relief of Ksh.1240 per month.

 Using the income rates below, solve the questions that follow.

|  |  |
| --- | --- |
| Income in Ksh. per month | Rates in Ksh per sh 20 |
| 1 – 8,4008401 – 18,00018001 – 30,00030001 – 36,00036001 – 48,000Above 48,000 | 234567 |

 Determine;

1. i) His monthly taxable income. (2 marks)

 ii) Net tax (PAYEE) (5 marks)

1. In addition to the PAYEE, the following deductions were made. Ksh.250 for NHIF, Ksh.120 service charges,he repays a loan at sh.4500 and contributes towards savings at sh.1800 every month. Calculate his net salary per month. (3 marks)
2. A triangle ABC has vertices A(-2, 6) B(2, 3) and C(-2, 3). Triangle A1B1C1 is the image of triangle ABC under a reflection in the line x = -3.
3. Draw triangle ABC and its image A1B1C1 on the same axis. (2 marks)
4. Triangle A1B1C1 is mapped onto A11B11C11 under a translation vector$\left(\genfrac{}{}{0pt}{}{10}{2}\right)$. Given that A111(6,-6)

B111(2, -3) and C111(6, -3) are the images of A111B111C111 under another translation.

1. Draw triangle A11B11C11 (2 marks)
2. Determine and describe fully the transformation that maps triangle A11B11C11 onto triangle

A111B111C111 (3 marks)

1. Describe fully the transformation that would map triangle ABC onto triangle A111B111C111 (3 marks)
2. a) From whole numbers 1 to 10, a number is selected at random, find the probability that, the number selected is a prime or a multiple of 3. (2 marks)

 b) A tetrahedron is thrown and a coin is tossed.

 i) List down all the possible events in the probability space. (1 mark)

 ii) Find the probability of getting atleast 2 and a head. (2 marks)

 c) i) A bag contains 6 white marbles and some brown ones. If the probability of picking a brown marble is 0.6, find the number of marbles in the bag. (3 marks)

 ii) Two marblesare then picked, one at a time from the bag in c(i) above, with replacement.

 Find the probability that the marbles picked are of different colours. (2 marks)

1. Three villages PQR are located from central town X which is on a bearing of 340o from another town Y. Village Q is east of town X and 6km from town Y, on the bearing of 040o while village P is on a bearing of 045o from town X. Village R and P are due north of town Y. Village R is on a bearing of 250o from village Q.
2. By scale drawing represent the above information in a diagram. (7 marks)
3. From the diagram find;
4. The bearing of village R from town X. (1 mark)
5. The distance between;

 Village P and Q (1 mark)

 Village R and town Y (1 mark)

1. ABCDEFGH is a prism where ABCD, FGHE, BCHG and ADEF are rectangles while AFGH and DCHE are trapezia. AB = 10cm, FG = 8cm, BC = 18cm and CH = 4.5cm.

 

1. Calculate the length of AH. (4 marks)
2. Calculate the angle between planes ABCD and BCHG. (2 marks)
3. The angle between the plane ABCD and ABHE (2 marks)
4. The volume of the prism. (2 marks)
5. a) Complete the table for 0o$\leq x \leq 360^{o}$ for the functions y = sin x and y = $\frac{1}{2}\sin(2x)$ (2 marks)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 |
| $$\frac{1}{2}\sin(2x)$$ | 0.00 |  | 0.43 |  |  | 0.25 | 0 |  | -0.43 |  | -0.43 |  | 0 |
| Sin x | 0.00 | 0.5 |  | 1 |  |  | 0 | -0.5 |  |  | -0.87 |  | 0 |

 b) Using a scale of 1cm represent 30o on the x-axis and 4cm to represent 1 unit on the y-axis, draw the graph of y = $\frac{1}{2}\sin(2x)$ and y = sin xo for 0o$\leq x \leq 360^{o}$ on the same axis. (5 marks)

c) Use your graph to find the range $\frac{1}{2}\sin(2x) \leq \sin(x)$ (1 mark)

 d) State the period and amplitude for the curve y = $\frac{1}{2}\sin(2x)$ (2 marks)

1. The displacement s metres of a particle moving along a straight line after t seconds is given by

s = -2t3 + $\frac{3}{2}$t2 + 3t + 4

1. Find its initial acceleration. (3 marks)
2. Calculate;
3. The time the particle was momentarily at rest. (3 marks)
4. Its displacement by the time it comes to rest momentarily. (2 marks)
5. Calculate the maximum velocity attained. (2 marksA certain carpenter has been contracted by a college to supply a number of beds and doors. He has to supply almost 100 items. He has a total of 480 man hours to do the work. In addition, the following conditions should be met.

|  |  |  |
| --- | --- | --- |
|  | Beds | Doors |
| Minimum number of items | 10 | 20 |
| Man hours per item | 2 | 6 |
| Profit per item | 200 | 300 |

 Taking x to represent the number of beds and y the number of doors:

1. Write all the inequalities to represent the above information. (4 marks)
2. Represent the inequalities on the grid provided. (4 marks)
3. Find the maximum profit that can be got from the supply. (2 marks)